

THE RECIPROCATING STEAM-ENGINE

the spindle. The parabola has the property that the subnormal h is constant (fig. 19). Therefore the height of cone would be constant. Only one speed would be possible, and the balls could take up any position within their range. This is a condition of neutral equilibrium.

The cross-armed governor is the simplest form of vertical gravity-controlled governor, in which the path of the balls may be made to approxi-

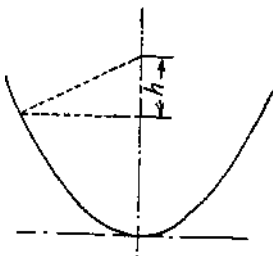


Fig. 19

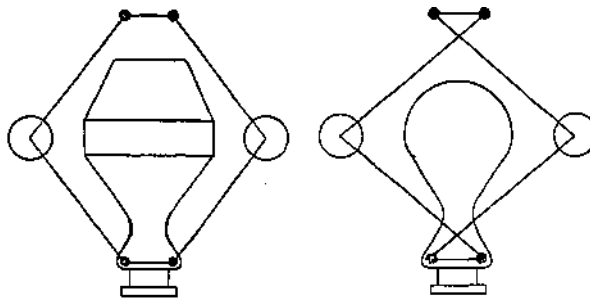


Fig. 20.—Porter Open-arm Governor

Fig. 21.—Porter Crossed-arm Governor

mate to parabolic arcs in the range of movement usual, but the point of suspension should not be situated too far from the axis, or the governor would not be stable.

The problem is not to secure absolute isochronism, but to keep the variation in speed within certain limits chosen with reference to the requirements of the kind of machinery driven by the engine, combined with power and stability. The weighted pendulum, or Porter type, is the simplest

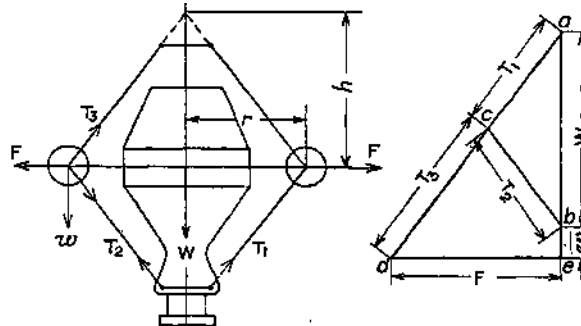


Fig. 22.—Force Diagram for Porter Governor

solution. In its ordinary form a heavy mass is attached to the sliding collar on the spindle, and the weight of the mass is supported by the centrifugal force generated in the balls. If the same range of movement is given to the collar, as in the simple type, obviously there is

more stored work available.

It is necessary, therefore, to give to the balls a velocity sufficiently high to enable them to support their own weight and that of the central mass by the centrifugal force generated in them.

Assuming, for both the open- and the crossed-arm type, that the arrange-